

FIG. 1

- 10) PROCESSOR
- 20) MAIN MEMORY
- 21) MAIN MEMORY MANAGEMENT INFORMATION
- 60) ADDED MAIN MEMORY
- 50) CONNECTING SWITCH
- 30) ADDITION REPORTING MEANS
- 40) CONNECTION MANAGING MEANS

FIG. 2

- 21) MAIN MEMORY MANAGEMENT INFORMATION
- 22) AVAILABLE START ADDRESS
- 23) AVAILABLE END ADDRESS

FIG. 3

- 10) PROCESSOR
- 20) MAIN MEMORY
- 21) MAIN MEMORY MANAGEMENT INFORMATION
- 60) ADDED MAIN MEMORY
- 80) BUS
- 30) ADDITION REPORTING MEANS
- 70) BUS CONTROLLING MEANS

FIG. 4

- 100) COMPUTER

200-1) FIRST MEMORY  
220) STORAGE FACILITY  
230-1) USER REGION  
240) OS REGION  
250) RESOURCE MANAGEMENT INFORMATION  
21) MAIN MEMORY MANAGEMENT INFORMATION  
210) MEMORY BUS INTERFACE  
130) I/O DEVICE  
110) PROCESSOR  
200-2) SECOND MEMORY  
230-2) USER REGION  
150) BUS  
30) ADDITION REPORTING MEANS  
70) BUS CONTROLLING MEANS  
120) NONVOLATILE MEMORY  
122) CONFIGURATION INFORMATION  
123) REAL MEMORY SIZE INFORMATION  
124) EXPANDABLE MEMORY INFORMATION  
140) SECONDARY STORAGE DEVICE  
143) DATA

FIG. 5

START INITIALIZING PROCESS

310) LET FIRMWARE 121 INITIALIZE PROCESSOR 110  
320) LET FIRMWARE 121 INITIALIZE FIRST MEMORY 200-1

330) LET FIRMWARE 121 INITIALIZE I/O DEVICE 130 AND  
SECONDARY STORAGE DEVICE 140  
340) LET FIRMWARE 121 READ OS 141 FROM SECONDARY STORAGE  
DEVICE 140 AND WRITE IT TO MEMORY 200  
350) PASS CONTROL FROM FIRMWARE 121 TO OS 141  
360) LET OS 141 READ CONFIGURATION INFORMATION 122 USING  
FIRMWARE 121 TO PREPARE RESOURCE MANAGEMENT INFORMATION 250  
END INITIALIZING PROCESS

FIG. 6

START MEMORY ADDING PROCESS

405) LET ADDITION REPORTING MEANS 30 REQUEST BUS  
CONTROLLING MEANS 70 TO CLOSE BUS 150  
408) LET BUS CONTROLLING MEANS 70 CLOSE BUS 150  
410) CONNECT SECOND MEMORY 200-2 TO BUS 150  
415) LET ADDITION REPORTING MEANS 30 REQUEST BUS  
CONTROLLING MEANS 70 TO OPEN BUS 150  
418) LET BUS CONTROLLING MEANS 70 OPEN BUS 150  
420) START UTILITY 142 TO CALL FIRMWARE 121  
430) LET FIRMWARE 121 INITIALIZE SECOND MEMORY 200-2 TO  
UPDATE REAL MEMORY SIZE INFORMATION 123  
440) LET UTILITY 142 CALL OS TO ACQUIRE REAL MEMORY SIZE  
INFORMATION 123 AND TO UPDATE MAIN MEMORY MANAGEMENT  
INFORMATION 21  
END MEMORY ADDING PROCESS

FIG. 7

- 21) MAIN MEMORY MANAGEMENT INFORMATION
- 22) AVAILABLE START ADDRESS
- 23) AVAILABLE END ADDRESS
- 24) UNTRANSLATABLE START ADDRESS
- 25) UNTRANSLATABLE END ADDRESS
- 26) LOGICAL-PHYSICAL ADDRESS TRANSLATION PAIRS
- 27) FREE LIST

FIG. 8

- 1) LOGICAL-PHYSICAL ADDRESS TRANSLATION PAIRS
- 2) ADDRESS
- 3) PHYSICAL ADDRESS
- 4) LOGICAL ADDRESS
- 5) MANAGEMENT INFORMATION
- 6) RESERVED AREA
- 7) LOGICAL-PHYSICAL TRANSLATABLE REGION
- 8) USABLE AREA
- 9) UNTRANSLATABLE REGION
- 230-2) USER REGION (ADDED)
- 230-1) USER REGION
- 240) OS REGION
- 250) RESOURCE MANAGEMENT REGION
- 21) MEMORY MANAGEMENT INFORMATION

26) LOGICAL-PHYSICAL ADDRESS TRANSLATION PAIRS

FIG. 9

START REGION RESERVING PROCESS

510) CALCULATE MONOPOLIZED MAIN MEMORY SIZE NEEDED TO

RESERVE ONE PAGE OF VIRTUAL MEMORY

520) DETERMINE RESERVABLE UPPER LIMIT BASED ON THE  
CALCULATED VALUE AND ON CURRENTLY INSTALLED MAIN MEMORY  
SIZE

530) LET USER SELECT VALUE BELOW THE RESERVABLE UPPER LIMIT  
AND RESERVE SELECTED VALUE

540) SET RESERVED VALUE TO EXPANDABLE MEMORY INFORMATION

124

END REGION RESERVING PROCESS

FIG. 10

1010) MAXIMUM EXPANDABLE MEMORY SIZE:

MINIMUM EXPANDABLE MEMORY SIZE:

1020) RECOMMENDED ADDITIONAL MEMORY SIZE:

1030) ADDED MEMORY SIZE >

FIG. 11

120) NONVOLATILE MEMORY

122) CONFIGURATION INFORMATION

123) REAL MEMORY SIZE INFORMATION

124) EXPANDABLE MEMORY INFORMATION  
125) NORMALLY OPERATING MEMORY SIZE INFORMATION IN EFFECT  
UPON SETTING

FIG. 12

START REGION RESERVING PROCESS

510) CALCULATE MONOPOLIZED MAIN MEMORY SIZE NEEDED TO  
RESERVE ONE PAGE OF VIRTUAL MEMORY  
520) DETERMINE RESERVABLE UPPER LIMIT BASED ON THE  
CALCULATED VALUE AND ON CURRENTLY INSTALLED MAIN MEMORY  
SIZE  
530) LET USER SELECT VALUE BELOW THE RESERVABLE UPPER LIMIT  
AND RESERVE SELECTED VALUE  
540) SET RESERVED VALUE TO EXPANDABLE MEMORY INFORMATION  
124  
550) SET NORMALLY OPERATING CURRENT MEMORY SIZE TO NORMALLY  
OPERATING MEMORY SIZE INFORMATION 125 IN EFFECT UPON  
SETTING  
END REGION RESERVING PROCESS

FIG. 13

START INITIALIZING PROCESS

310) LET FIRMWARE 121 INITIALIZE PROCESSOR 110  
320) LET FIRMWARE 121 INITIALIZE FIRST MEMORY 200-1  
325) LET FIRMWARE 121 SET EXPANDABLE MEMORY INFORMATION 124

330) LET FIRMWARE 121 INITIALIZE I/O DEVICE 130 AND  
SECONDARY STORAGE DEVICE 140  
340) LET FIRMWARE 121 READ OS 141 FROM SECONDARY STORAGE  
DEVICE 140 AND WRITE IT TO MEMORY 200  
350) PASS CONTROL FROM FIRMWARE 121 TO OS 141  
360) LET OS 141 READ CONFIGURATION INFORMATION 122 USING  
FIRMWARE 121 TO PREPARE RESOURCE MANAGEMENT INFORMATION 250  
END INITIALIZING PROCESS

FIG. 14

START EXPANDABLE MEMORY INFORMATION SETTING PROCESS  
610) IS NORMALLY OPERATING MEMORY SIZE IN EFFECT UPON  
SETTING DIFFERENT FROM NORMALLY OPERATING CURRENT MEMORY  
SIZE?  
620) SET ZERO TO EXPANDABLE MEMORY INFORMATION 124  
END EXPANDABLE MEMORY INFORMATION SETTING PROCESS

FIG. 15

120) NONVOLATILE MEMORY  
122) CONFIGURATION INFORMATION  
123) REAL MEMORY SIZE INFORMATION  
124) EXPANDABLE MEMORY INFORMATION  
126) TOTAL MEMORY SIZE INFORMATION  
127) NORMALLY OPERATING MEMORY SIZE LOWER LIMIT  
128) LIMIT TO MAXIMUM RATIO BETWEEN EXPANDABLE MEMORY SIZE

AND NORMALLY OPERATING MEMORY SIZE

FIG. 16

START PROCESS ALLOWING USER TO DESIGNATE CONFIGURATION  
INFORMATION

710) RECEIVE SUM OF NORMALLY OPERATING MEMORY SIZE AND  
EXPANDABLE MEMORY SIZE FROM USER AND SET THE SUM TO REGION  
126 IN NONVOLATILE MEMORY

720) RECEIVE NORMALLY OPERATING MEMORY SIZE LOWER LIMIT  
FROM USER AND SET THE LIMIT TO REGION 127 IN NONVOLATILE  
MEMORY

730) RECEIVE MAXIMUM RATIO BETWEEN EXPANDABLE MEMORY SIZE  
AND NORMALLY OPERATING MEMORY SIZE FROM USER AND SET THE  
RATIO TO REGION 128 IN NONVOLATILE MEMORY

END PROCESS ALLOWING USER TO DESIGNATE CONFIGURATION  
INFORMATION

FIG. 17

START EXPANDABLE MEMORY INFORMATION SETTING PROCESS

810) NORMALLY OPERATING MEMORY SIZE  $\geq$  NORMALLY OPERATING  
MEMORY SIZE LOWER LIMIT?

840) SET ZERO TO EXPANDABLE MEMORY INFORMATION 124

820) {TOTAL MEMORY SIZE - NORMALLY OPERATING MEMORY  
SIZE}/NORMALLY OPERATING MEMORY SIZE  $\leq$  MAXIMUM RATIO?

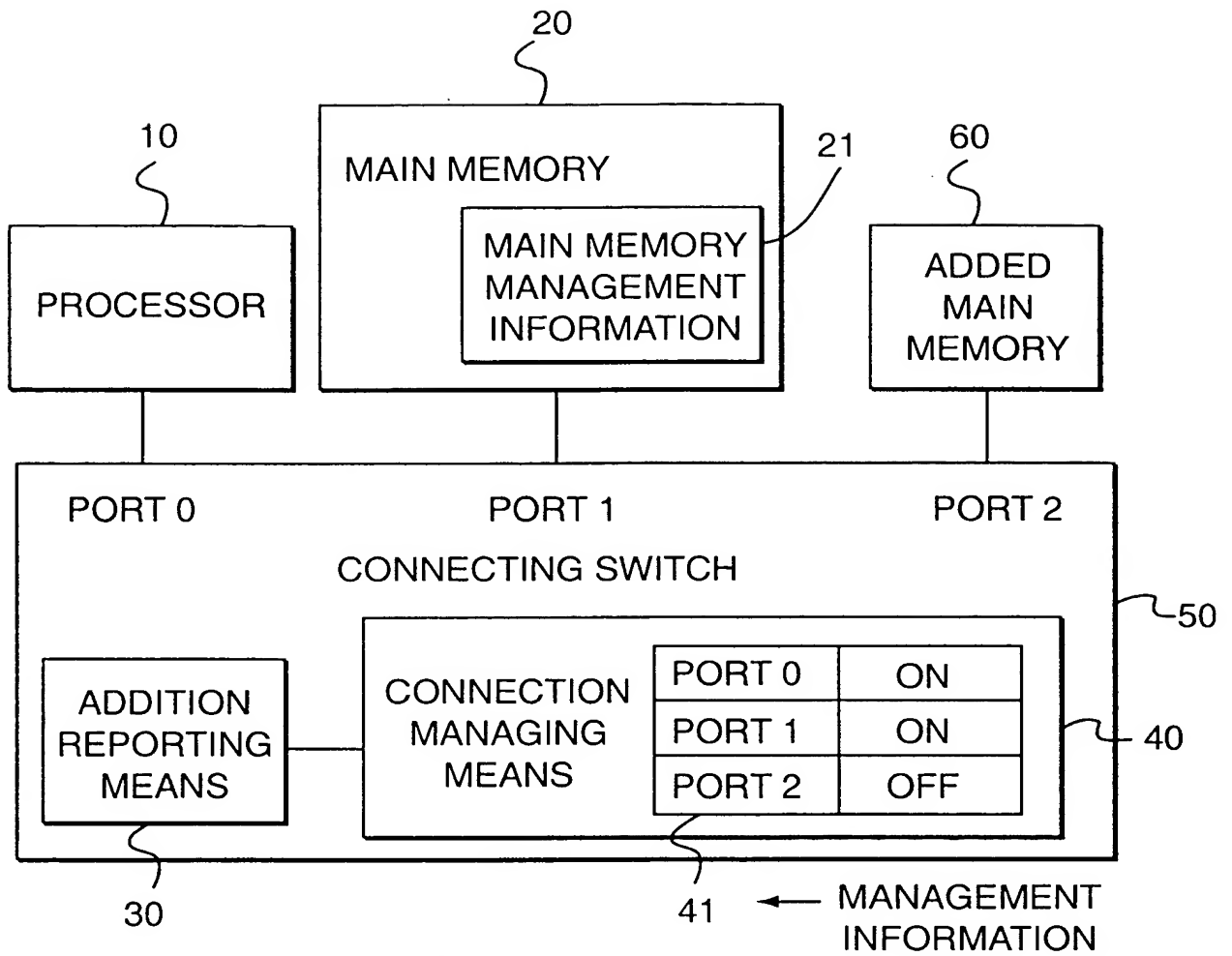
850) SET {NORMALLY OPERATING MEMORY SIZE X MAXIMUM RATIO}



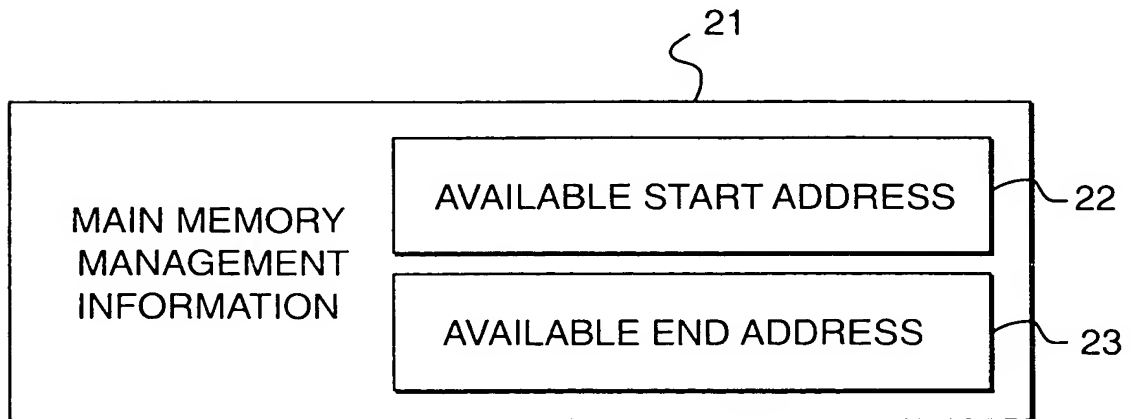
TO EXPANDABLE MEMORY INFORMATION 124

830) SET {TOTAL MEMORY SIZE - NORMALLY OPERATING MEMORY  
SIZE} TO EXPANDABLE MEMORY INFORMATION 124

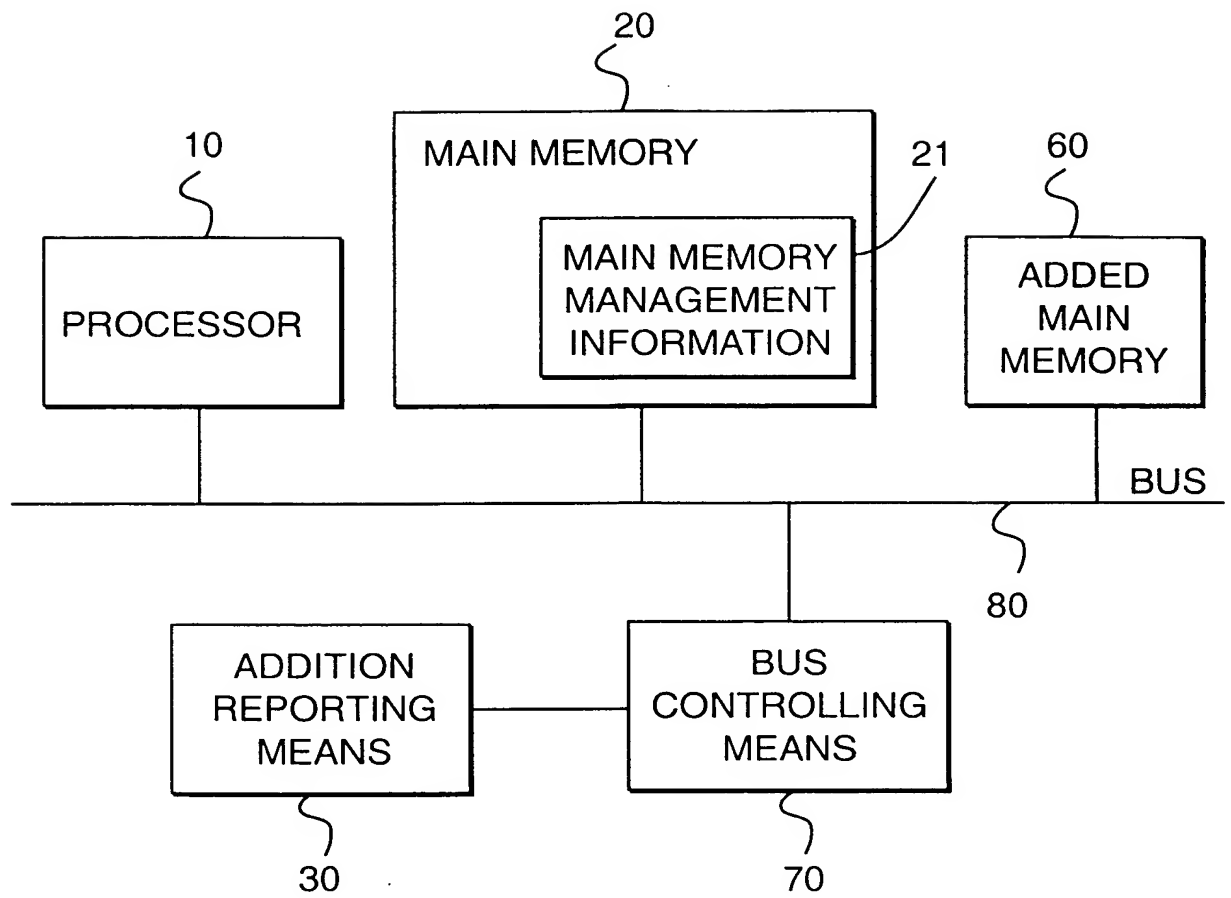
END EXPANDABLE MEMORY INFORMATION SETTING PROCESS



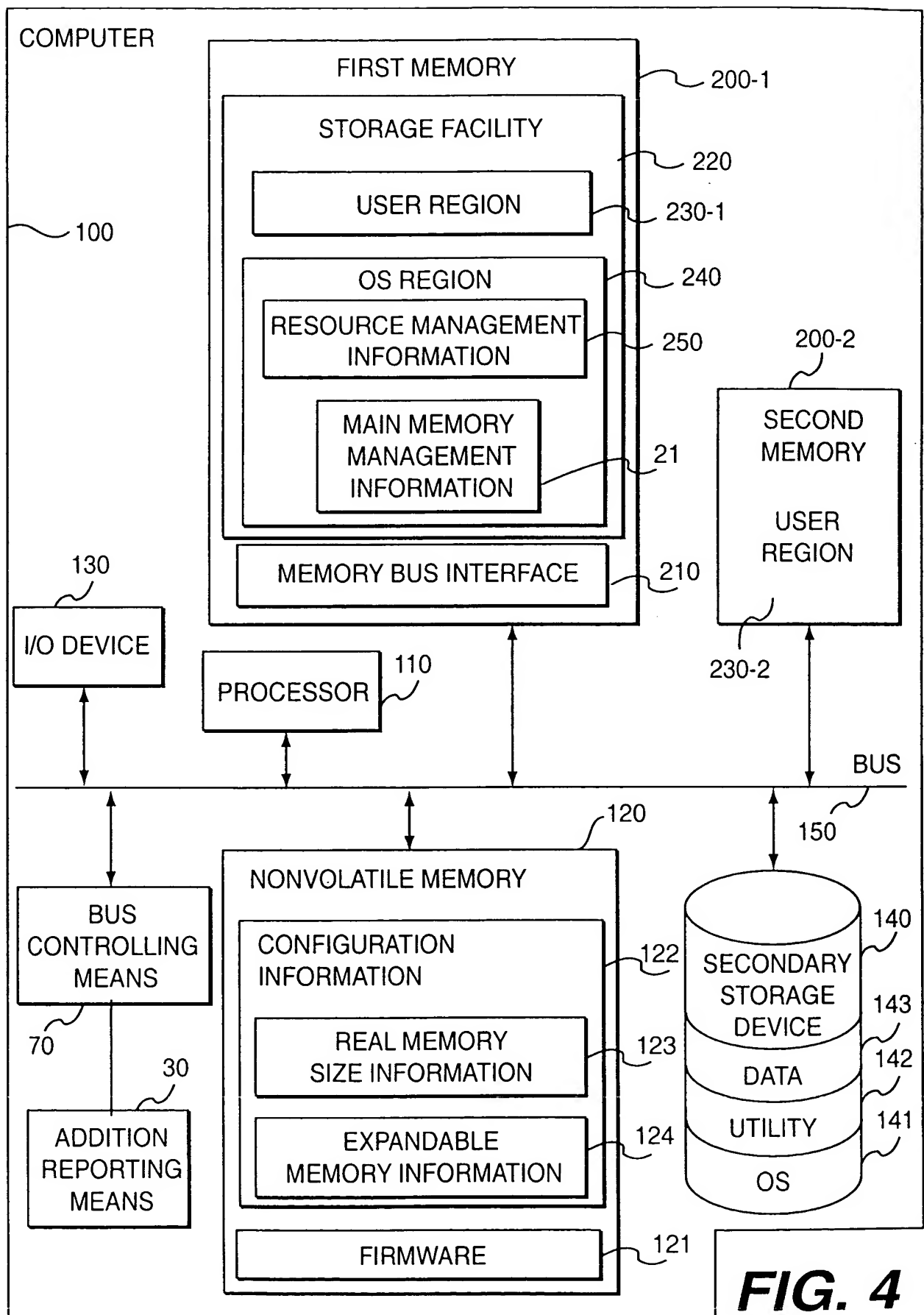
**FIG. 1**



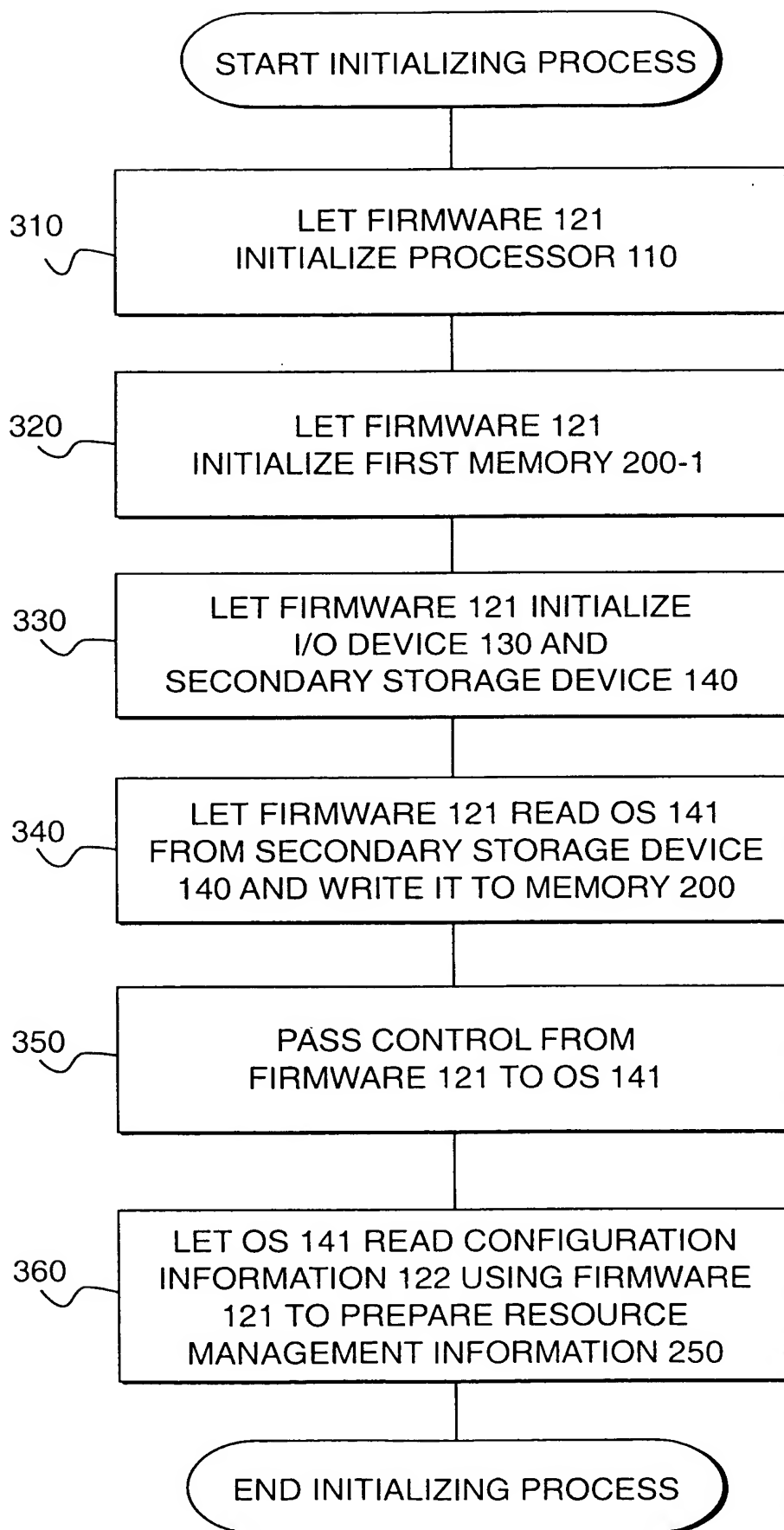
**FIG. 2**



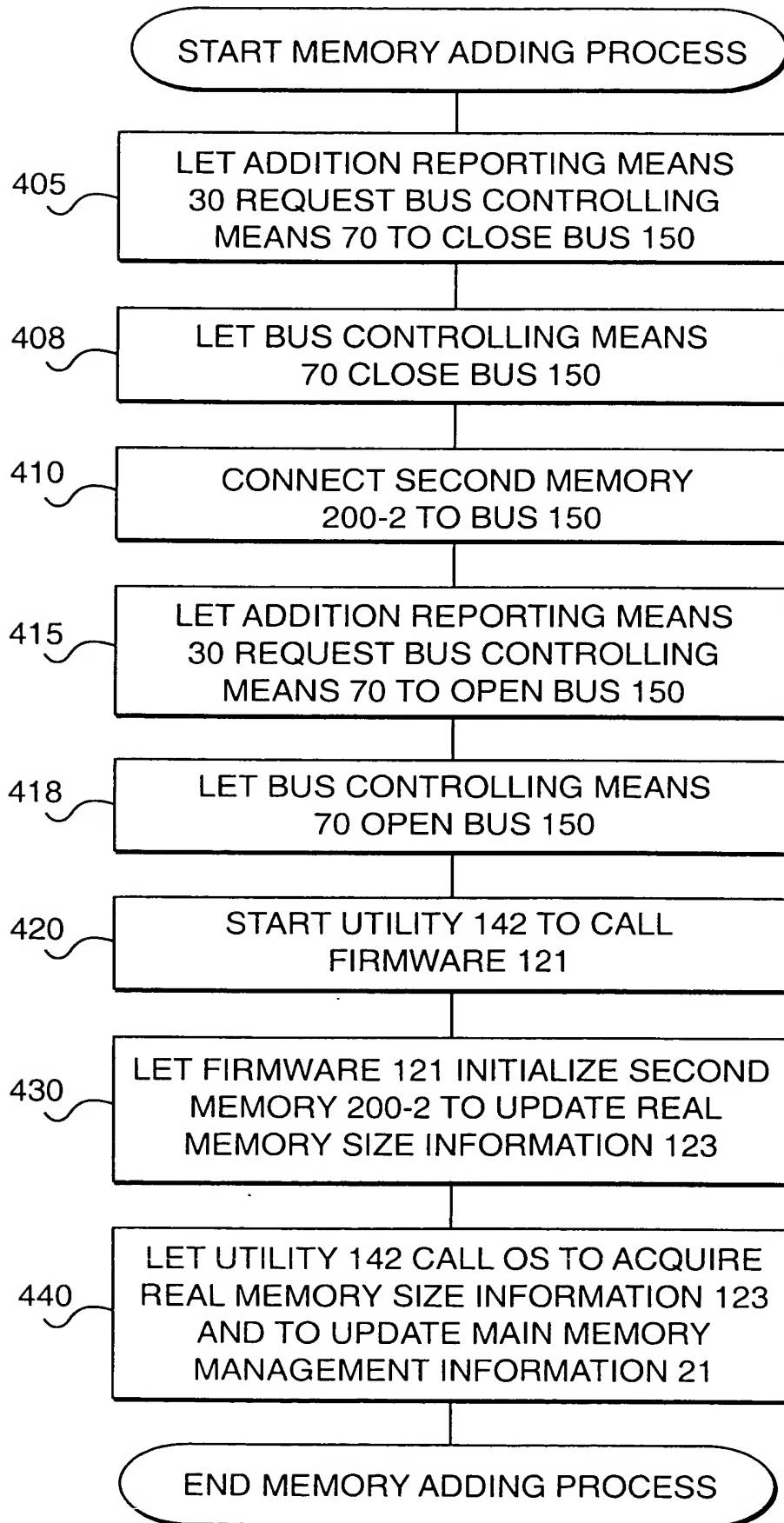
**FIG. 3**



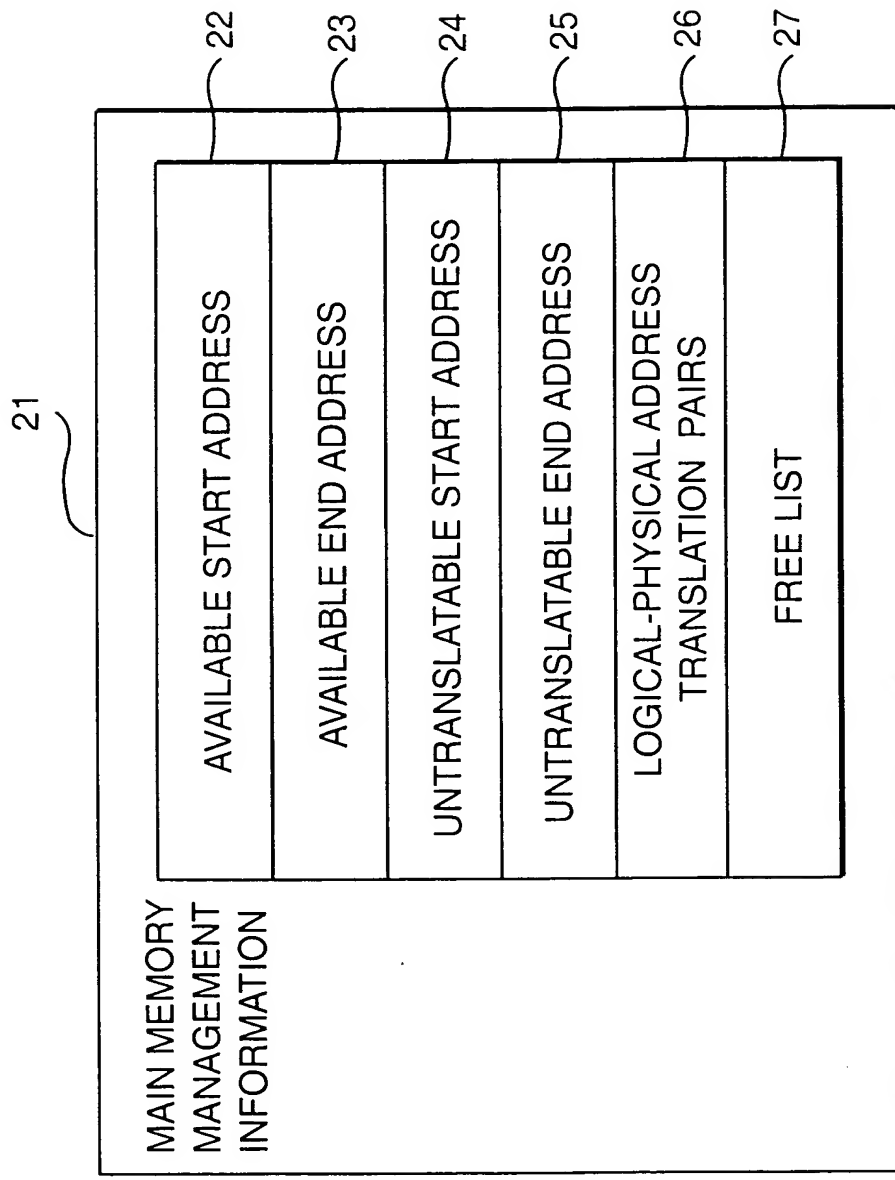
**FIG. 4**



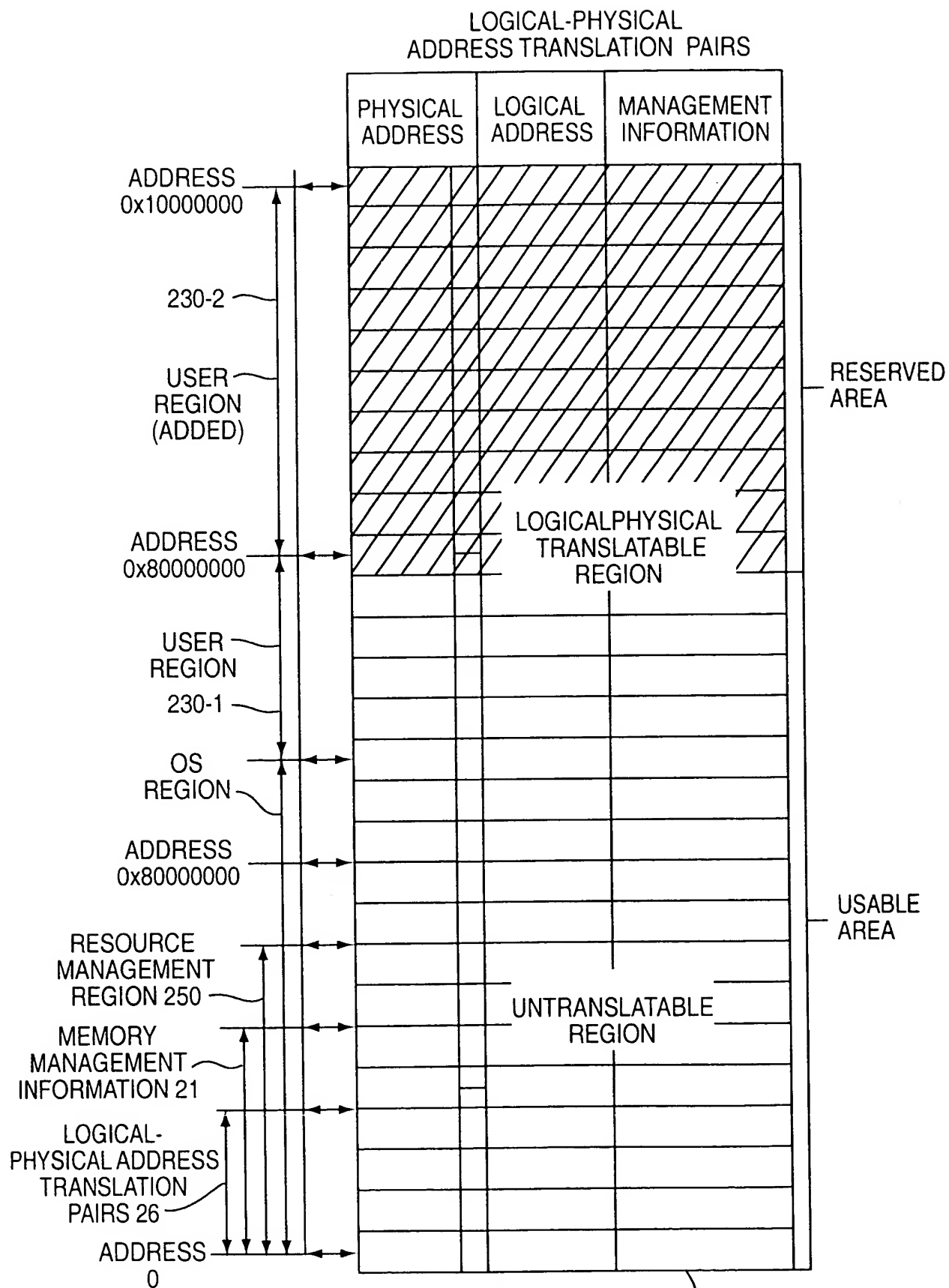
**FIG. 5**



**FIG. 6**

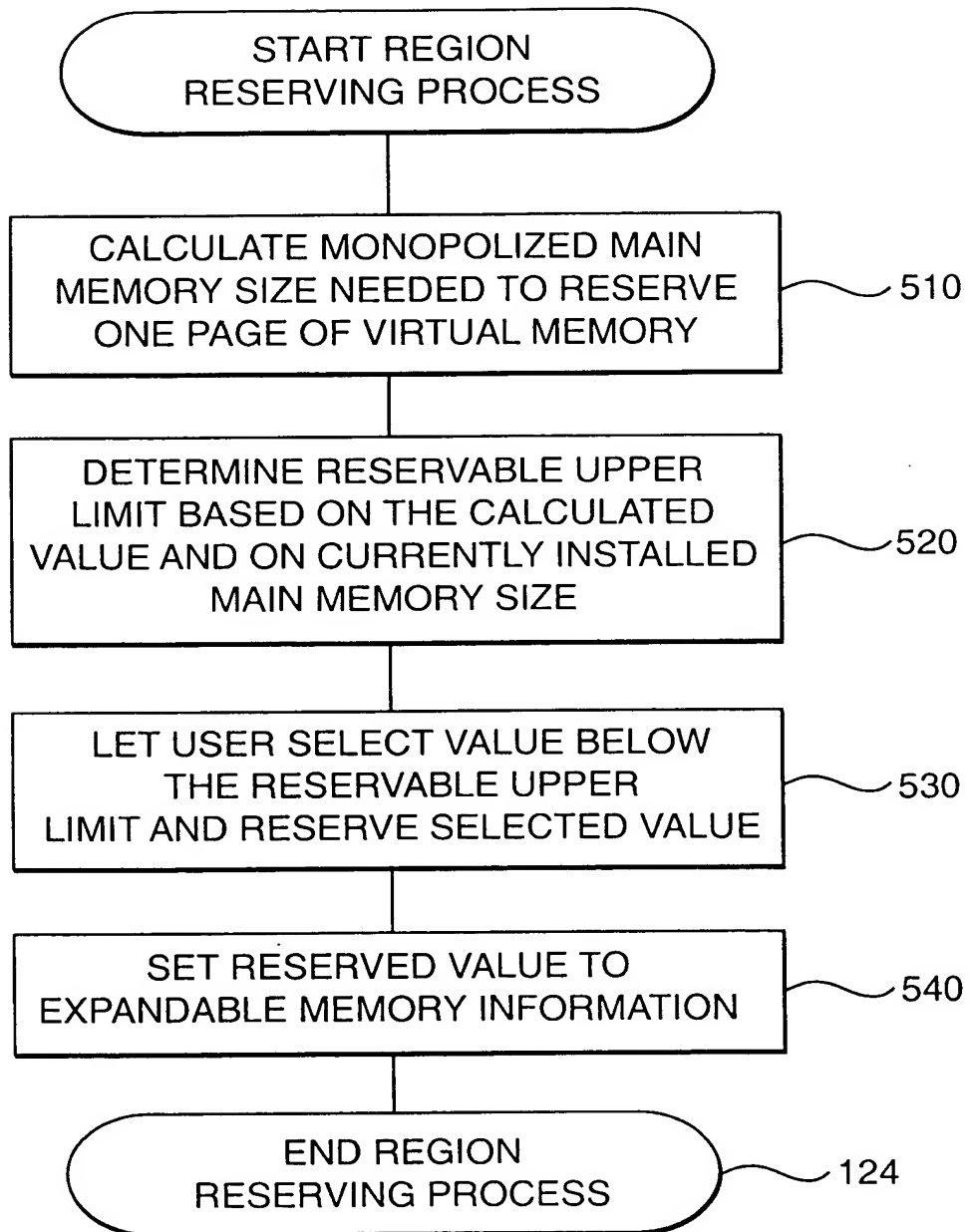


**FIG. 7**

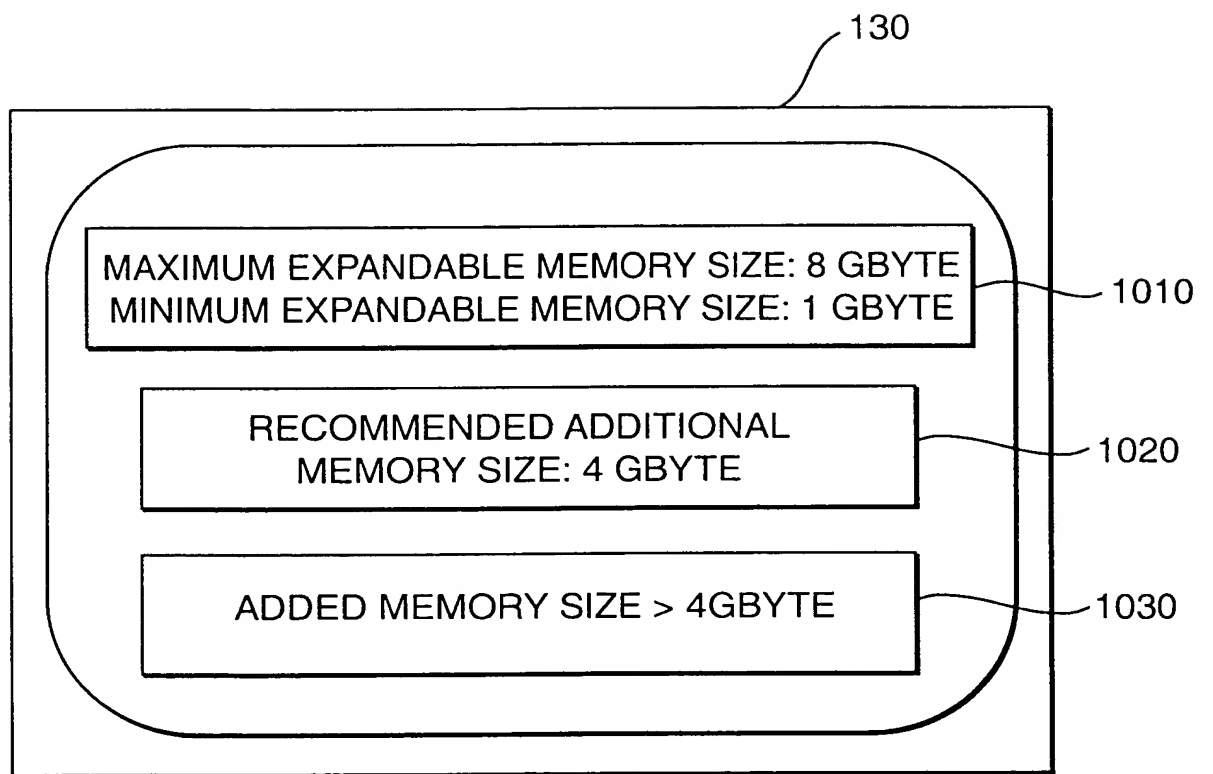


**FIG. 8**

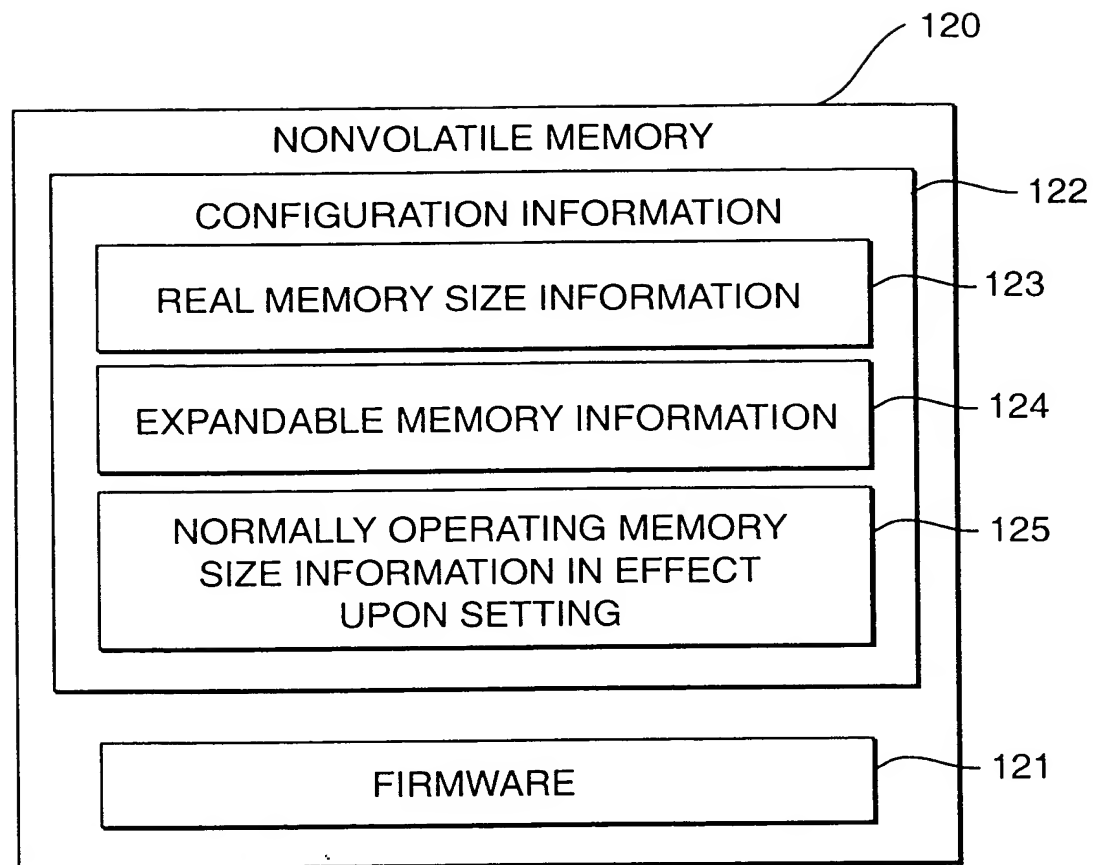




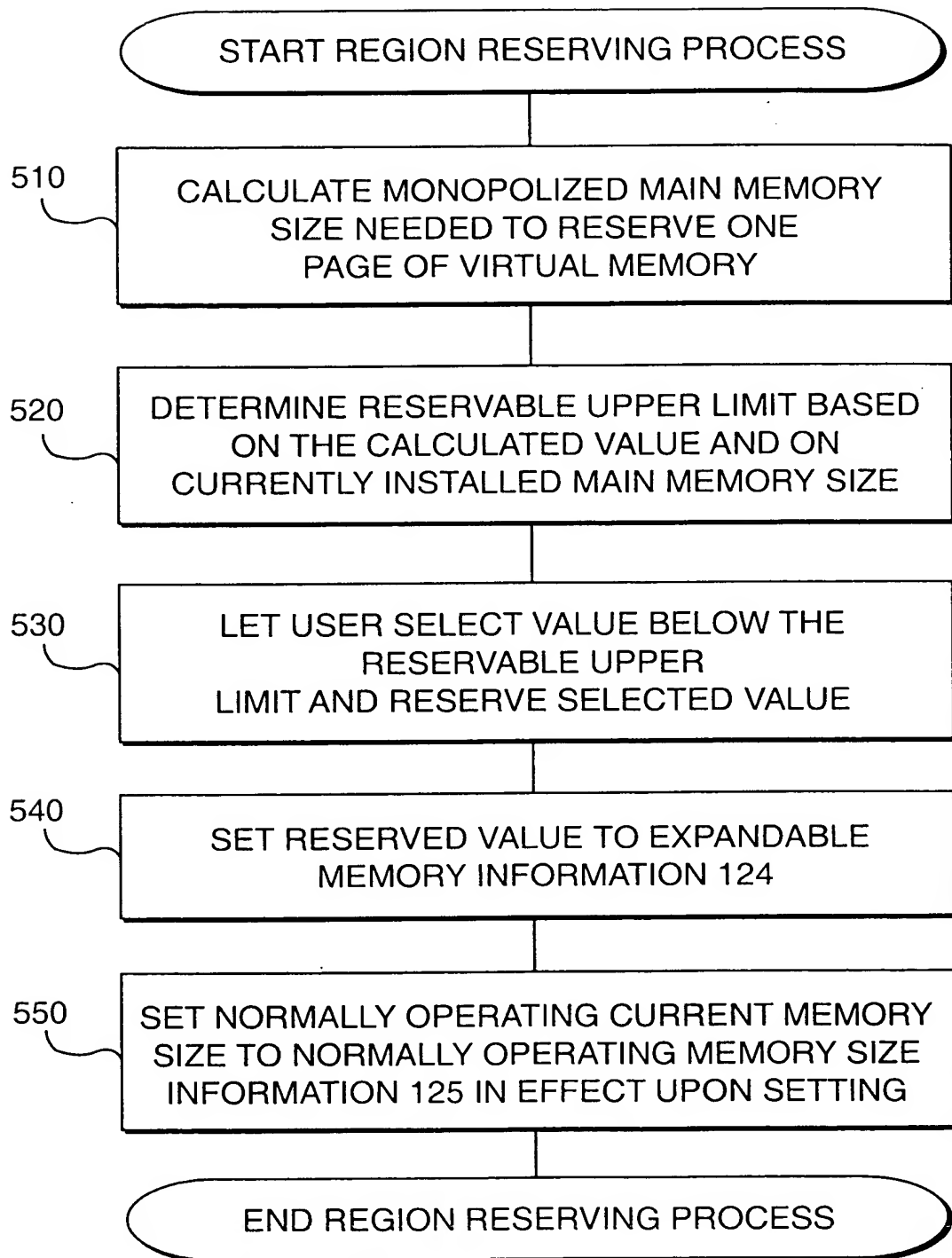
**FIG. 9**



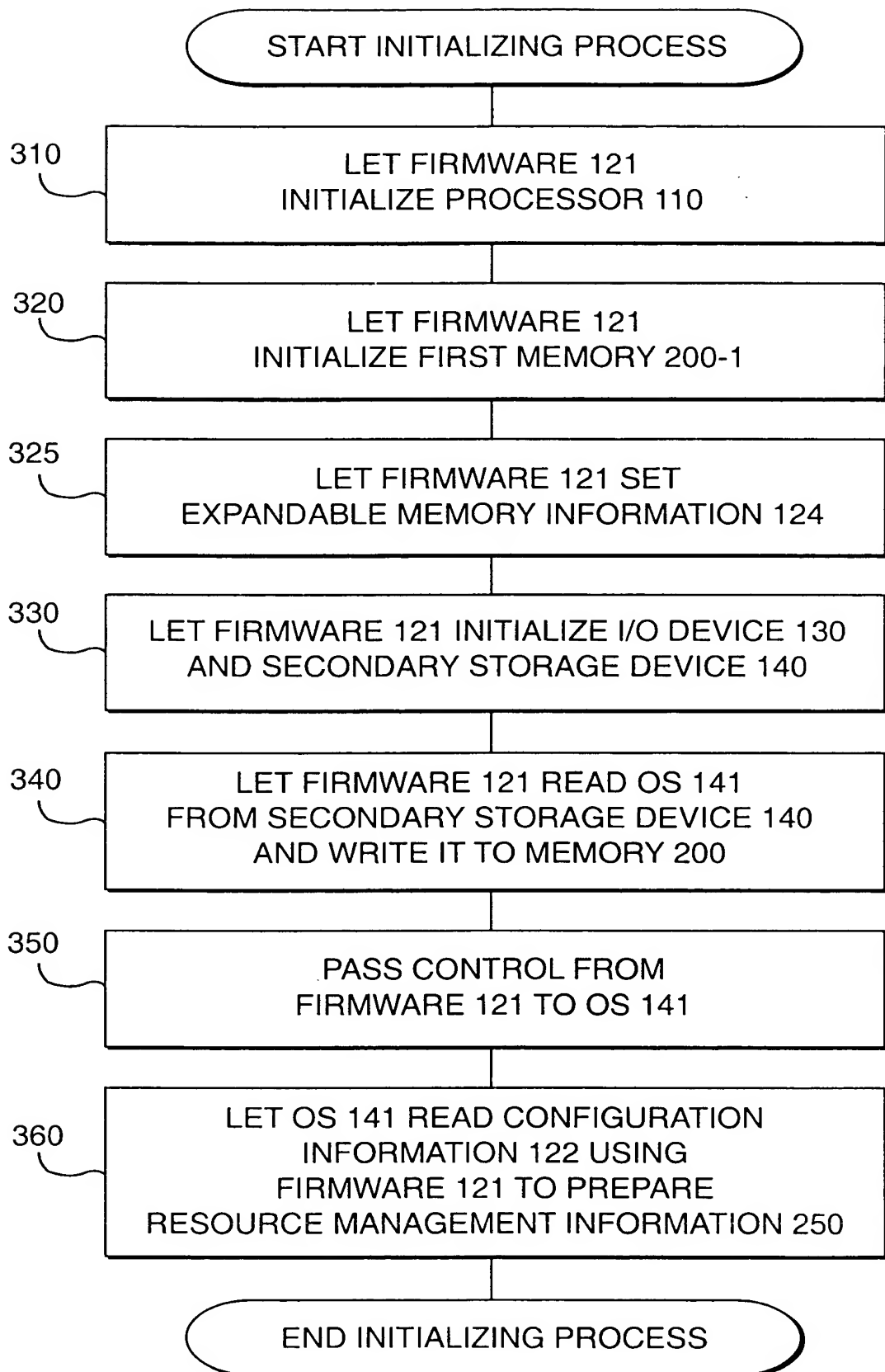
**FIG. 10**



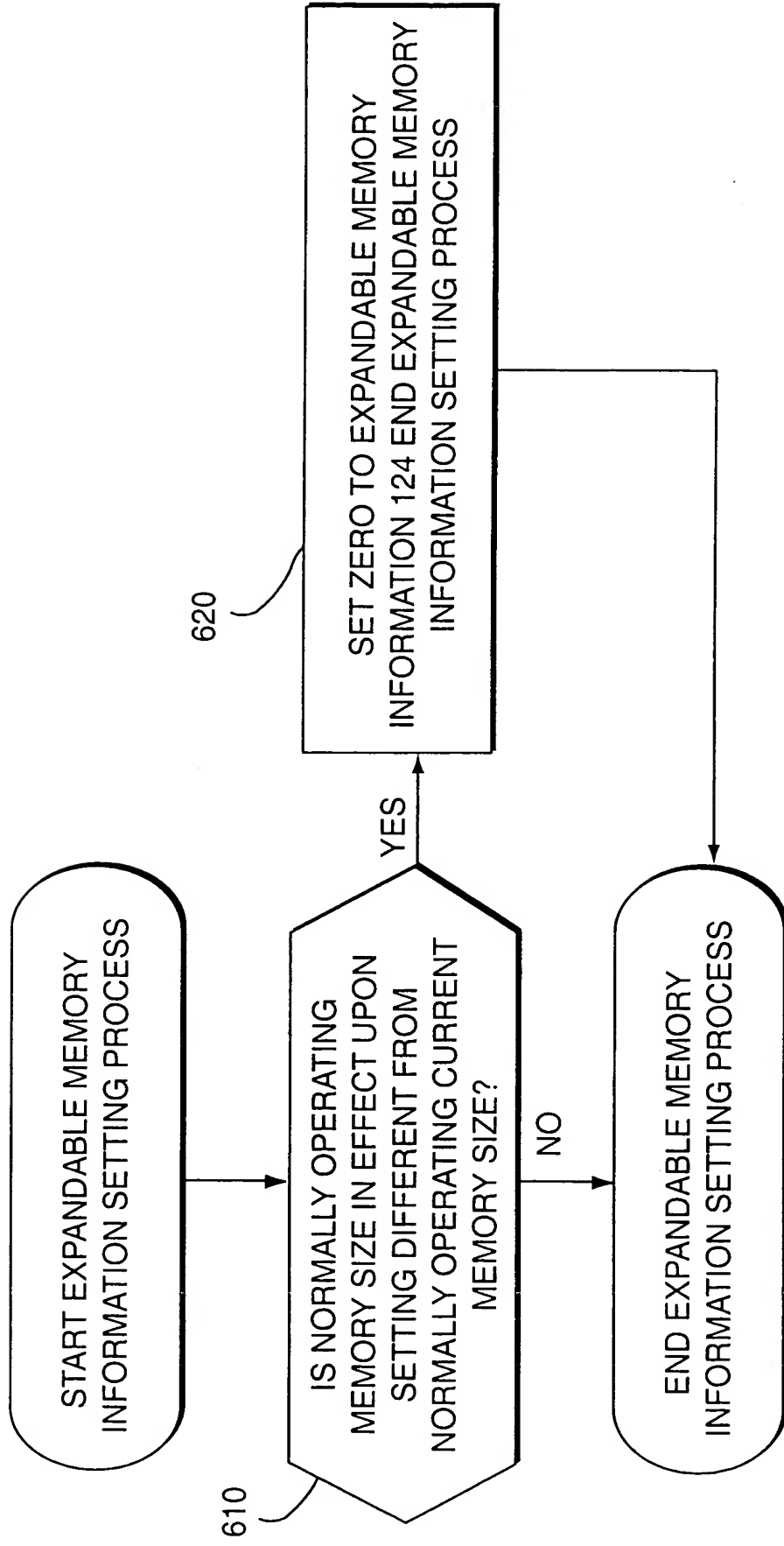
**FIG. 11**



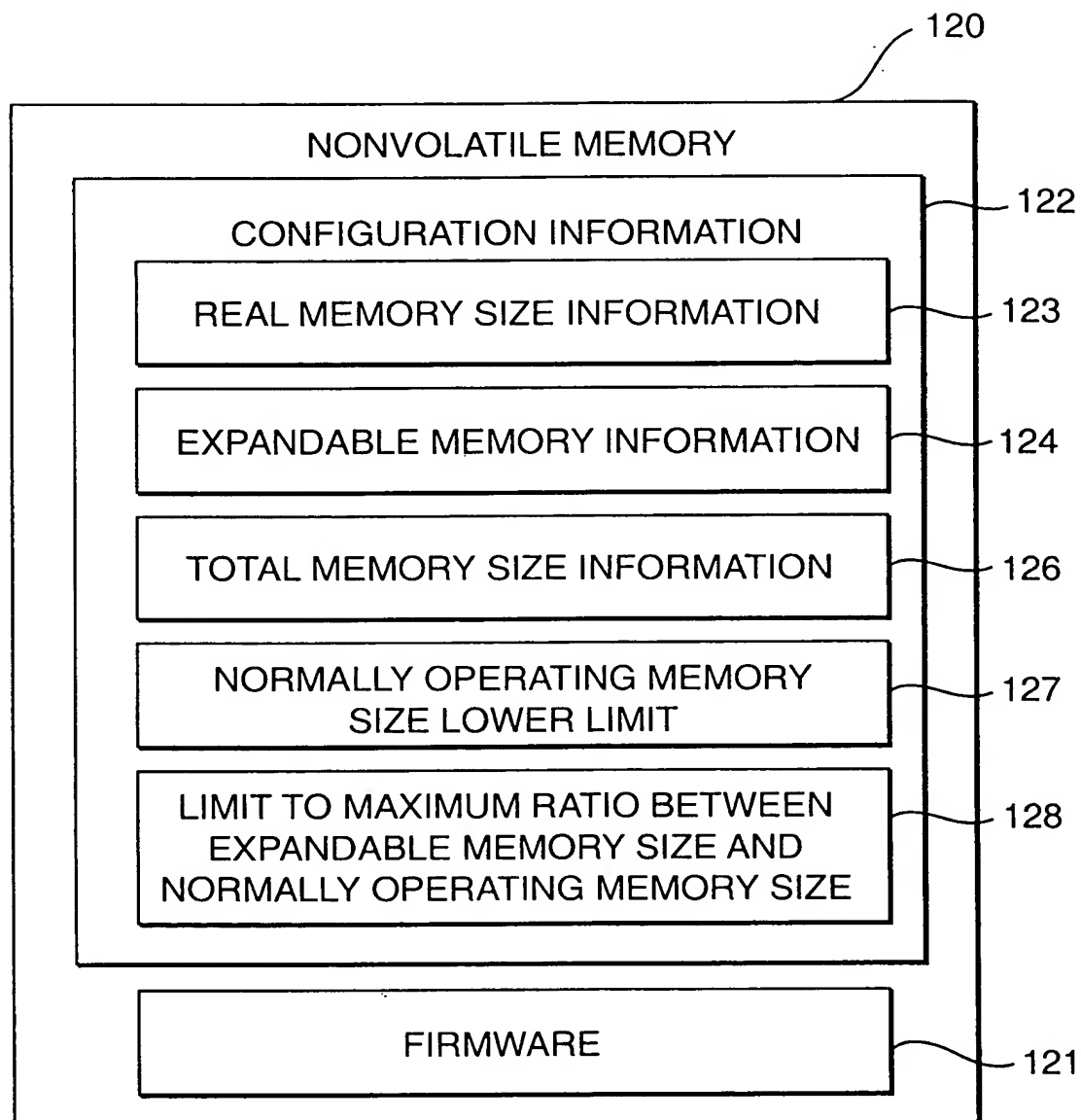
**FIG. 12**



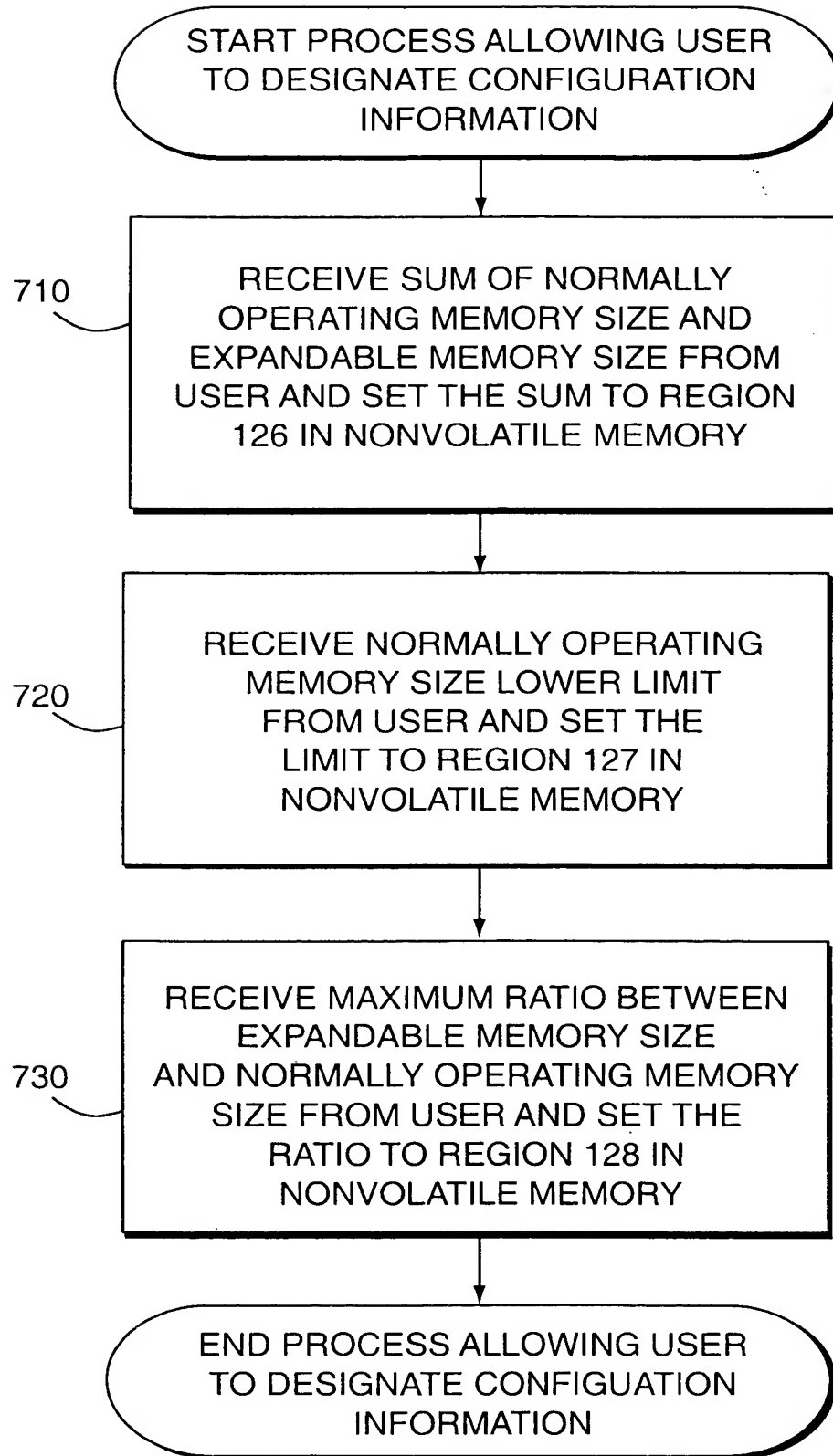
**FIG. 13**



**FIG. 14**



**FIG. 15**



**FIG. 16**



